the phase control signals accordingly. may be used. It is not necessary to use a microcontroller. although use of a microcontroller such as the ST6 from SGS-THOMSON Microelectronics provides a simple and cost effective solution.

Although the embodiments described use a triac as phase controlling element. any other component able to perform phase control may be used. These may exhibit full wave or half wave control.

What we claim is:

1. A method for controlling a speed of rotation of a universal motor driven by an AC source. the method comprising the steps of:
   - measuring a value of a temporal property of a current. to determine the speed of rotation of the universal motor:
   - comparing the measured value of the temporal property to a predetermined value;
   - adjusting the measured value of the temporal property so that it approaches the predetermined value; and
   - selecting the predetermined value from a number of stored values.

2. The method of claim 1. wherein the measured temporal property is an instantaneous current flowing at a predetermined point in time during an AC cycle.

3. The method of claim 1. wherein the step of adjusting the current is performing by controlling a triac with variable phase.

4. The method of claim 1. wherein the step of measuring is performed by a microcontroller.

5. The method of claim 1. wherein the step of measuring is performed by a sensor which generates an analog sensing voltage. and which provides the voltage to an analog-to-digital converter.

6. A method for controlling a speed of rotation of a universal motor driven by an AC source. the method comprising the steps of:
   - measuring a value of a temporal property of a current. to determine the speed of rotation of the universal motor;
   - comparing the measured value of the temporal property to a predetermined value; and
   - adjusting the measured value of the temporal property so that it approaches the predetermined value.
   - wherein the measured temporal property is selected from the group consisting of:
     - an instantaneous current flowing at a voltage zero crossing point in an AC cycle.
     - a rate of decrease of the current at a certain time. during an AC half cycle.
     - a period of time between a voltage zero crossing point and an end of current conduction. during an AC half cycle. and
     - a period of time between a voltage zero crossing point and a point of time when the current attains a predetermined value.

7. A method for controlling a speed of rotation of a universal motor driven by an AC source. the method comprising the steps of:
   - measuring a value of a temporal property of a current. to determine the speed of rotation of the universal motor;
   - comparing the measured value of the temporal property to a predetermined value; and
   - adjusting the measured value of the temporal property so that it approaches the predetermined value.
   - wherein the predetermined value is determined as a function of the level of the phase control.

8. A circuit for the control of a speed of rotation of a universal motor driven from an AC voltage. comprising:
   - a phase control component in series with the universal motor;
   - a current detector for measuring a value of a temporal property of a current flowing through the universal motor;
   - a timing circuit. connected to the pulse generating circuit. for timing the control signals with respect to the AC voltage cycle;
   - a reference circuit for indicating a predetermined value of the temporal property of the waveform of the current through the universal motor;
   - a control circuit for controlling the timing circuit to cause the measured value of the temporal property to approach the predetermined value: and
   - a pulse generating circuit. responsive to the timing circuit. the reference circuit. and the control circuit. for generating control signals to the phase control component.
   - wherein the predetermined value is selected from a number of stored values.

9. The circuit of claim 8. wherein the pulse generating circuit. the timing circuit. the measurement circuit. the control circuit and the reference circuit are replaced by a microcontroller including a synchronization input. an analog to digital converter. a counter. a voltage reference. an input/output circuit. a central processing unit and a non-volatile memory.

10. The circuit of claim 8. wherein the phase control component is a triac.

11. A method for controlling a speed of rotation of a universal motor driven by an AC source. the method comprising the steps of:
   - measuring a value of a temporal property of a current. to determine the speed of rotation of the universal motor;
   - comparing the measured value of the temporal property to a predetermined value;
   - adjusting the measured value of the temporal property so that it approaches the predetermined value.
   - wherein the step of adjusting the current is performing by turning on a component once per half-cycle of the AC source voltage.

12. A method for operating a universal motor from an AC power line supply voltage. without use of a positional sensor. comprising the steps of:
   - (a.) repeatedly turning-on a component which applies voltage from the AC power line to the motor;
   - (b.) monitoring the current through the motor. and measuring a value of a temporal property of the current through the motor. to determine a speed of rotation of the motor without use of a positional sensor: and
   - (c.) dynamically controlling the turning-on step (a). in dependence on the measuring the value of the temporal property step. to maintain the speed of the motor at a desired value independently of the loading of the motor. wherein the temporal property is selected from the group consisting of:
     - an instantaneous current flowing at a zero crossing point in the AC cycle.
     - a rate of decrease of the current at an end of current conduction. during each half AC cycle.
     - a period of time between a zero crossing point and an end of current conduction. during each half AC cycle. and
     - a period of time between a zero crossing point and the current attaining a predetermined value.

13. The method of claim 12. wherein the component is a triac.

28. A method for controlling a speed of rotation of a universal motor driven by an AC source, the method comprising the steps of:

measuring a value of a temporal property of a current through the universal motor;

determining a speed of rotation of the universal motor using the measured value of the temporal property;

comparing the determined speed of rotation with a desired speed of rotation; and

adjusting the current through the motor in response to the step of comparing,

wherein the measured temporal property is selected from the group consisting of:

an instantaneous current flowing at a predetermined point in time during an AC cycle,

an instantaneous current flowing at a voltage zero crossing point in an AC cycle,

a rate of decrease of the current at a certain time, during an AC half cycle, and

a period of time between a voltage zero crossing point and an end of current conduction, during an AC half cycle.

29. The method of claim 28, wherein the measured temporal property is a period of time between a voltage zero crossing point and a point of time when the current attains a predetermined value.

30. A method for controlling a speed of rotation of a universal motor driven by an AC source, the method comprising the steps of:

measuring a value of a temporal property of a current through the universal motor;

determining a speed of rotation of the universal motor using the measured value of the temporal property;

comparing the determined speed of rotation with a desired speed of rotation; and

adjusting the current through the motor in response to the step of comparing,

wherein the value of the temporal property includes a value of a temporal property of a waveform of the current.

31. A method for controlling a speed of rotation of a universal motor driven by an AC source, the method comprising the steps of:

measuring a value of a temporal property of a current, to determine the speed of rotation of the universal motor;

comparing the measured value of the temporal property to a predetermined value;

adjusting the measured value of the temporal property so that it approaches the predetermined value,

wherein the step of measuring a value includes measuring a value of a temporal property of a waveform of the current.

32. A circuit for the control of a speed of rotation of a universal motor driven from an AC voltage, comprising:

a phase control component in series with the universal motor;

a current detector for measuring a value of a temporal property of a current flowing through the universal motor;

a timing circuit, connected to the pulse generating circuit, for timing the control signals with respect to the AC voltage cycle;

a reference circuit for indicating a predetermined value of the temporal property of the waveform of the current through the universal motor;

a control circuit for controlling the timing circuit to cause the measured value of the temporal property to approach the predetermined value; and

a pulse generating circuit, responsive to the timing circuit, the reference circuit, and the control circuit, for generating control signals to the phase control component,

wherein a value of a temporal property includes a value of a temporal property of a waveform of the current.

33. A method for operating a universal motor from an AC power line supply voltage, without use of a positional sensor, comprising the steps of:

(a.) repeatedly turning-on a component which applies voltage from the AC power line to the motor;

(b.) monitoring the current through the motor, and measuring a value of a temporal property of the current through the motor, to determine a speed of rotation of the motor without use of a positional sensor; and

(c.) dynamically controlling the turning-on step (a), in dependence on the measuring the value of the temporal property step, to maintain the speed of the motor at a desired value independently of the loading of the motor,

wherein measuring the value of a temporal property includes a measuring a value of a temporal property of a waveform of the current.

34. A motor system, comprising:

a universal motor;

a sensor which is operatively connected to the motor, and which provides an output which indicates the instantaneous current flowing through the motor;

a component which selectable applies voltage from a power line to the motor;

control circuitry operatively connected to control the component and to receive the output of the sensor, the control circuitry being connected to measure a temporal property of the output of the sensor and to control the component in dependence on the temporal property,

wherein the temporal property includes a value of a temporal property of a waveform of the current.

14. The method of claim 12. wherein the monitoring and measuring step is performed by a microcontroller.

15. The method of claim 12. wherein the component is turned on once per half-cycle of the power line voltage.

16. The method of claim 12. wherein a sensor generates an analog sensing voltage. and wherein the method further includes comparing the analog sensing voltage against a reference voltage to determine the value of the temporal property.

17. The method of claim 12. wherein a sensor generates an analog sensing voltage. and provides the voltage to an analog-to-digital converter.

18. The method of claim 12. wherein the temporal property is an instantaneous current flowing at a predetermined point in time during the AC cycle.

19. A motor system. comprising:

a universal motor:

a sensor which is operatively connected to the motor, and which provides an output which indicates the instantaneous current flowing through the motor;

a component which selectably applies voltage from a power line to the motor;

control circuitry operatively connected to control the component and to receive the output of the sensor. the control circuitry being connected to measure a temporal property of the output of the sensor and to control the component in dependence on the temporal property.

wherein the sensor generates an analog sensing voltage. and wherein the analog sensing voltage is compared against a reference voltage.

20. The system of claim 19. wherein the component is a triac.

21. The system of claim 19. wherein the control circuitry comprises a microcontroller.

22. The system of claim 19. wherein the component is turned on once per half-cycle of the power line voltage.

23. A motor system. comprising:

a universal motor:

a sensor which is operatively connected to the motor. and which provides an output which indicates the instantaneous current flowing through the motor;

a component which selectably applies voltage from a power line to the motor;

control circuitry operatively connected to control the component and to receive the output of the sensor. the control circuitry being connected to measure a temporal property of the output of the sensor and to control the component in dependence on the temporal property.

wherein the sensor generates an analog sensing voltage. and provides the analog sensing voltage to an analog-to-digital converter.

24. A motor system. comprising:

a universal motor;

a sensor which is operatively connected to the motor, and which provides an output which indicates the instantaneous current flowing through the motor;

a component which selectably applies voltage from a power line to the motor;

control circuitry operatively connected to control the component and to receive the output of the sensor. the control circuitry being connected to measure a temporal property of the output of the sensor and to control the component in dependence on the temporal property.

wherein the temporal property is selected from the group consisting of:

the instantaneous current flowing at a predetermined point in time during an AC cycle.

the instantaneous current flowing at a zero crossing point in an AC cycle.

a rate of decrease the current at an end of current conduction. during each half AC cycle.

a period of time between a zero crossing point and the current attaining a predetermined value.

25. The system of claim 24. wherein the temporal property is a period of time between a zero crossing point and an end of current conduction. during each half AC cycle.

26. A circuit for the control of a speed of rotation of a universal motor driven from an AC voltage. comprising:

a phase control component in series with the universal motor;

a current detector for measuring a value of a temporal property of a current flowing through the universal motor;

a timing circuit. connected to the pulse generating circuit. for timing the control signals with respect to the AC voltage cycle;

a reference circuit for indicating a predetermined value of the temporal property of the waveform of the current through the universal motor;

a control circuit for controlling the timing circuit to cause the measured value of the temporal property to approach the predetermined value; and

a pulse generating circuit. responsive to the timing circuit. the reference circuit. and the control circuit. for generating control signals to the phase control component.

wherein the phase control component is turned on once per half-cycle of the AC voltage.

27. A circuit for the control of a speed of rotation of a universal motor driven from an AC voltage. comprising:

a phase control component in series with the universal motor;

a current detector for measuring a value of a temporal property of a current flowing through the universal motor;

a timing circuit. connected to the pulse generating circuit. for timing the control signals with respect to the AC voltage cycle;

a reference circuit for indicating a predetermined value of the temporal property of the waveform of the current through the universal motor;

a control circuit for controlling the timing circuit to cause the measured value of the temporal property to approach the predetermined value; and

a pulse generating circuit. responsive to the timing circuit. the reference circuit. and the control circuit. for generating control signals to the phase control component.

wherein the temporal property is selected from the group consisting of:

an instantaneous current flowing through the motor at a predetermined point in time during the AC cycle.

an instantaneous current flowing at a voltage zero crossing point in the AC cycle.

a rate of decrease of the current at an end of current conduction. during an AC half-cycle.

a period of time between a voltage zero crossing point and an end of current conduction. during an AC half-cycle. and

a period of time between a voltage zero crossing point and a point of time when the current attains a predetermined value.

28. A method for controlling a speed of rotation of a universal motor driven by an AC source, the method comprising the steps of:

measuring a value of a temporal property associated with the universal motor, to determine the speed of rotation of the universal motor;

comparing the measured value of the temporal property to a predetermined value;

adjusting the measured value of the temporal property so that it approaches the predetermined value; and

selecting the predetermined value from a number of stored values.